

## **Arthropods in mature eastern hemlock forests: assessing the non-target effects of basal bark imidacloprid application for control of hemlock woolly adelgid on forest floor and canopy arthropod fauna in southwestern Nova Scotia**

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As the invasive and highly destructive hemlock woolly adelgid (*Adelges tsugae*) continues its spread across Nova Scotia, the province's stands of eastern hemlock (*Tsuga canadensis*) face an ever-mounting threat to their long-term survival. Conservation practitioners in the region are increasingly relying on insecticides (like the neonicotinoid, imidacloprid) to control infestations of *A. tsugae*. In an effort to achieve faster and more economical control of the pest, many practitioners are pivoting to novel application methods of the chemical, like basal bark sprays. Basal bark application of imidacloprid raises concerns about potential harmful impacts to non-target arthropods inhabiting treated hemlock stands. To address these concerns, we sampled a selection of arthropods inhabiting the forest floor and the canopy layers both before and after basal bark application of imidacloprid, as well as in nearby untreated stands. For our sampling, we used pitfall and baited funnel trapping to sample terrestrial and canopy biodiversity. In total, 33 arthropod clades were analyzed for changes in their abundance that were characterised by a treatment and year interaction. While we identified a significant decline in the abundance of spine waisted ant (*Aphaenogaster* spp.) linked to imidacloprid treatment, we also identified declines in the abundance of two species (the beetles *Synuchus impunctatus* and *Trypodendron lineatum*) in untreated control plots. While the drivers of these findings are unknown, they may suggest an effect of hemlock canopy decline coincident with hemlock woolly adelgid infestation. Further investigation into imidacloprid's potential to yield non-target effects on local arthropods is warranted, particularly on spine-waisted ants.

Keywords: entomology, forest ecology, hemlock woolly adelgid, insecticide control, insect diversity